REMARKS

This response is submitted for the Office Action of September 24, 2004. A two-month extension of time has been requested to reset the latest date for this response to February 24, 2005.

Claims 1, 4, 8, 13, 16, and 20 have been canceled. Reconsideration of Claims 2, 3, 5, 6, 9-12, 14, 15, 17, and 21-24 is requested in view of the above amendments and the arguments presented below. New Claims 25-28 have been added, and examination of these claims is requested. Support for the new claims can be found in the Specification as follows: Claim 25, paragraphs 0015 and 0038; Claim 26, paragraph 38 and Fig. 1; Claim 27, paragraph 0044; and Claim 28, paragraphs 0034, 0038, 0049, and Fig. 1.

Claims 7, 18, and 19 were objected to as being dependent upon a rejected base claim, but the Examiner advised that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Reconsideration of the objection to Claim 7 is requested based on arguments presented below regarding the patentability of Claim 6, from which Claim 7 depends. Claim 18 as been amended as recommended by the Examiner, and Claims 18 and 19 are now in form for allowance. Claims 2, 3, 5, 6, 9, 10, 11, 14, 15, 17, 21, 22, and 23 have been amended to include subject matter of canceled claims from which they originally depended.

In view of the above amendments, Claims 2, 3, 5-7, 9-12, 14, 15, 17-19, and 21-28 are presently in the application.

Rejection of Claim 6 under 35 U.S.C. 102(b)

Claim 6 has been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent 6,324,848 to J. R. Gladden et al ("Gladden").

Gladden discloses a two-stage turbocharger compressor system for an internal combustion engine wherein the turbocharger compressors are driven by an engine exhaust turbine. Each compressor stage or compressor wheel has an inlet and an outlet. Referring to Fig. 2, outlet 38 of first compressor wheel 32 is connected to (a) inlet 36 of first compressor wheel via valve 60 and bypass duct 48; (b) inlet 28 of engine exhaust-driven turbine wheel 22 via valve 60 and bypass duct 56; (c) the

atmosphere via bypass duct 46 and valve 60; and (d) outlet 64 of second compressor wheel 34 via bypass duct 50 and valve 60. Second outlet 42 of second compressor wheel 34 is connected to (a) inlet 36 of first compressor wheel via valve 60 and bypass duct 58; (b) inlet 28 of engine exhaust-driven turbine wheel 22 via valve 60 and bypass duct 54; and (c) the atmosphere via bypass duct 52 and valve 60.

The embodiment of the invention defined by Claim 6 and illustrated in Fig. 2, comprises an apparatus for regulating a driver driving a gas compressor (104) having a gas inlet and a gas outlet, wherein the driver has a maximum power, the apparatus comprising (1) a recycle pressure relief device (one of devices 122) in fluid communication with the gas outlet, the recycle pressure relief device adapted to receive a stream of a compressed gas having a discharge pressure from the gas outlet and (2) a conduit in fluid communication with the gas inlet, whereby the gas inlet receives at least a portion of the stream of the compressed gas transmitted to the conduit from the recycle pressure relief device (the one of devices 122) when the discharge pressure reaches a designated pressure. The apparatus includes at least one additional pressure relief device (another of devices 122) in fluid communication with the gas outlet, wherein the additional recycle pressure relief device adapted to receive an additional stream of the compressed gas from the gas outlet. The embodiment of Claim 6 therefore includes at least two recycle pressure relief devices, i.e., at least two of the three pressure relief devices 122 of Fig. 2.

The embodiment of Claim 6 is not identically disclosed by Gladden because each of Gladden's compressors (i.e., compressor wheels 32 and 34) has only one recycle pressure relief valve and bypass leading from a compressor outlet to the inlet of that compressor. It is seen in Fig. 2 of Gladden that first compressor wheel 32 has only one recycle pressure relief valve (60) and bypass (48) leading from the compressor outlet (38) to the compressor inlet (36). It is also seen in Fig. 2 that the second compressor wheel (34) has only one recycle pressure relief valve (60) and bypass (50) leading from the compressor outlet (volute 64) to the second compressor inlet via the interstage duct (44). Note that Gladden's second recycle pressure relief valve (60) and bypass (58) leading from the second compressor wheel outlet (42) lead to the inlet (36) of the first compressor wheel (32).

In contrast, the embodiment of Claim 6 includes at least two recycle pressure relief devices, i.e., at least two of the three pressure relief devices 122 of Fig. 2.

Because Gladden discloses only one recycle pressure relief valve and bypass for each of the compressor stages, there is no disclosure of the at least two recycle pressure relief devices in Claim 6, and the embodiment of that claim is not anticipated by Gladden. Accordingly, the Examiner is respectfully requested to withdraw the rejection of Claim 6 as anticipated by Gladden.

Objection to Claim 7

In view of the patentability of Claim 6 as argued above, it is requested that the objection to Claim 7 be withdrawn.

Rejection of Claims 2, 3, 5, 9-12, 14, 15, 17, and 21-24 under 35 U.S.C. 103(a)

Claims 2, 3, 5, 9-12, 14, 15, 17, and 21-24 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,033,735 to L. K. Swenson ("Swenson") in view of U.S. Patent 6,324,848 to J. R. Gladden et al ("Gladden").

Swenson discloses a single mixed refrigerant closed loop process for liquefying natural gas in which the refrigerant compressor is driven by a steam turbine. The mixed refrigerant contains a mixture of hydrocarbons and optionally a quantity of nitrogen, and the refrigerant is compressed to an elevated pressure, for example, 289 psia as given in the illustration at column 10, lines 64-66. A refrigerant suction drum is used at the compressor inlet.

The disclosure of Gladden is summarized above.

A claimed embodiment of the invention comprises an apparatus for regulating a driver driving a gas compressor (104) having a gas inlet and a gas outlet, wherein the driver has a maximum power, the apparatus comprising (1) a recycle pressure relief device (one of devices 122) in fluid communication with the gas outlet, the recycle pressure relief device adapted to receive a stream of a compressed gas having a discharge pressure from the gas outlet and (2) a conduit in fluid communication with the gas inlet, whereby the gas inlet receives at least a portion of the stream of the compressed gas transmitted to the conduit from the recycle pressure relief device (the one of devices 122) when the discharge pressure reaches a designated pressure. Other embodiments include methods that utilize this

apparatus. In the embodiments defined by rejected Claims 2, 3, 9, 12, 14, 15, 21, and 23, the compressor compresses a refrigerant and the compressor is driven by a gas turbine. The embodiments of Claims 5, 10, 17, and 22 include a vessel in flow communication with the gas inlet of the compressor. The embodiments of Claims 11 and 23 include a baseload LNG plant utilizing the compressor.

Embodiments of the claimed invention differ from the disclosure of Gladden as follows:

(1) Gladden discloses a turbocharger for an internal combustion engine wherein the compressor wheels are driven by engine exhaust gas. In contrast, embodiments of the claimed invention include a compressor driven by a gas turbine Claims 2, 3, 9, 12, 14, 15, 21, and 24 utilize a gas turbine (for example, a GE Frame 7EA gas turbine as described at p. 8, line 1) to drive the compressor. Other claimed embodiments include a baseload LNG plant using the compressor.

(2) Gladden compresses air or a fuel gas (column 5, lines 37-39); in contrast, the embodiments of Claims 2, 3, 9, 12, 14, 15, 21, and 24 compress a refrigerant.

(3) Gladden has no feed drum or vessel in fluid communication with the compressor inlet, but the embodiments of Claims 5, 10, 17, and 22 include this feature.

Embodiments of the claimed invention differ from the disclosure of Swenson as follows:

(1) Swenson does not disclose a recycle relief valve and line leading from the compressor outlet to the compressor inlet; in contrast, all rejected claimed embodiments include this feature.

(2) The compressor disclosed by Swenson utilizes a steam turbine driver whereas the embodiments of Claims 2, 3, 9, 12, 14, 15, 21, and 24 utilize a gas turbine driver.

Certain of the above differences clearly teach away from claimed embodiments as set forth below.

(1) Gladden's turbocharger for an internal combustion engine clearly teaches away from the claimed gas turbine refrigerant compressor. A person skilled in the compressor art would know that an internal combustion engine turbocharger and a refrigerant compressor are designed for different applications and are not interchangeable. For this reason, Gladden is a defective reference for use in judging the patentability of Claims 2, 3, 9, 12, 14, 15, 21, and 24.

(2) Swenson's compressor requires a steam turbine driver, and this teaches away from the claimed gas turbine driver. For this reasons, Swenson is a defective reference for use in judging the patentability of Claims 2, 3, 9, 12, 14, 15, 21, and 24.

The Examiner states at p. 3, lines 22-23, that Gladden teaches a system comprising a multi-stage gas compressor 20 driven by a single-shaft gas turbine 18. Applicants respectfully point out that Gladden's turbine wheel 22 is not a gas turbine – it is an exhaust turbine. The term "gas turbine" as understood in the art means an expansion turbine driven by hot, high-pressure gas from a dedicated gas turbine combustor. In contrast, the exhaust turbine in Gladden's system utilizes exhaust gas from an internal combustion engine wherein the exhaust gas is a byproduct of the engine operation.

Based upon the state of the compressor art as defined by Gladden and as defined by Swenson, the skilled person would have no motivation to combine the disclosures of Gladden and Swenson to arrive at the embodiments of the claimed invention. Applicants respectfully submit that it is well known in the compressor art that internal combustion engine turbochargers provide discharge pressures that are less than about 35 psia, which is well below the elevated pressures exemplified by Swenson's 296 psia (Fig. 1a; column 10, lines 64-66) that are required to operate refrigeration systems for LNG systems. A typical discharge pressure for an internal combustion engine turbocharger is given in a textbook reference enclosed herewith entitled *The Design of High-Efficiency Turbomachinery and Gas Turbines* by D. G. Wilson, pp. 351-361, MIT Press, Cambridge, Massachusetts, 1991. Table 9.1 at p. 352 of this reference gives an example of a diesel engine turbocharger having a discharge pressure of $2x10^5$ N/m^2 (29 psia). It also seen at p. 353 that the shaft speed of this turbocharger is 30,084 rev/min, which the skilled person would realize is

far higher than the shaft speed of LNG refrigerant compressors such as that disclosed by Swenson.

The skilled person would readily understand, therefore, that substitution of the internal combustion engine turbocharger of Gladden for the steam turbine driven refrigerant compressor of Swenson would result in an inoperative LNG process because Gladden's internal combustion engine turbocharger could not generate the discharge pressures required to operate Swenson's liquefied natural gas refrigeration system properly.

Based upon the above arguments, Applicants submit that the Examiner has not established a clear case of non-patentability of Claims 2, 3, 5, 9-12, 14, 15, 17, and 21-24 under 35 U.S.C. 103(a) over Swenson in view of Gladden, and request that the rejection be withdrawn.

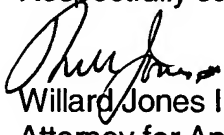
Summary

In view of the amendments and arguments presented above, it is submitted that Claims 2, 3, 5-7, 9-12, 14, 15, 17, and 21-24 are patentable over cited prior art. Claims 18 and 19 have been amended as recommended by the Examiner and are in form for allowance. Examination of new Claims 25-27 is requested and allowance is anticipated. Accordingly, a timely Notice of Allowance for Claims 2, 3, 5-7, 9-12, 14, 15, 17-19, and 21-27 is requested.

Applicants will amend the Specification and Abstract of the Disclosure after final allowance of the claims in order to place the Specification and Abstract of the Disclosure in harmony with the claims as amended (MPEP 1302.01).

Prior art made of record and not relied upon is acknowledged.

Respectfully submitted,



Willard Jones II
Attorney for Applicants
Registration No. 31,172
7201 Hamilton Boulevard
Allentown, PA 18195-1501
(610) 481-4587